

Tuberculosis of the knee

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Abstract

Extrapulmonary manifestations of tuberculosis are reported in less than one in five cases with the knee affected in 8% after the spine and hip. We report a case of isolated highly erosive tuberculosis of the knee presenting in a previously fit Vietnamese woman. The difficulties of diagnosis, modalities of chemotherapeutic management, and surgical treatment are discussed.

Introduction

Tuberculosis (TB), once the romantic disease of poets and paupers, currently is undergoing a resurgence in the United Kingdom. In 2008, 8769 cases were diagnosed, representing a 2.2% rise on the previous year's figures and an incidence of 14.2 cases per 100,000 population.¹ Reasons for the re-emergence of TB as a significant illness in the UK include increased and more widespread immigration, ease of exotic foreign travel for the native population, and increasing prevalence of immunosuppressed HIV/AIDS patients. Extrapulmonary infection with *Mycobacterium tuberculosis* has musculoskeletal involvement in up to 19% of cases.²

We report a case of TB of a native knee joint in a well Vietnamese lady who reported an indolent course of low-grade knee pain for six months prior to presentation. Although the knee is affected in approximately 8% of cases,² to our knowledge this is the first such case in the English literature of TB of the native knee with no other systemic signs or symptoms. Although it is unlikely that this represents a primary TB of the knee, it does suggest in certain patients that we should consider TB reactivation as a possible cause of joint symptoms.

Case Report

A slim 75-year-old woman of Vietnamese ori-

gin was referred by her general practitioner to the orthopedic clinic with a painful right knee. Her symptoms had gradually worsened over a period of six months whereby now she had an antalgic gait, found it difficult to climb stairs, and had a limited range of movement of the knee. Courses of analgesics and physiotherapy had made no difference to her pain, and initial radiographs showed mild degenerative changes in all three compartments of the right knee with gross preservation of the joint space. There was no recent history of trauma, of respiratory, infective, or joint disease, or of recent travel, and she immigrated to Britain from Vietnam thirty years previously.

Examination of the right knee revealed a swollen warm knee, a fixed flexion deformity of 20°, flexion to 70°, and the knee was held in valgus of approximately 12°. Examination of the right hip, right ankle, and left knee were normal. A chest radiograph was interpreted as normal, and right knee radiographs (Figures 1 and 2) demonstrated rapid progression of an erosive area over the lateral tibial plateau. A diagnosis of erosive arthropathy was made and a slow-acting infection was considered. Automated blood counts demonstrated a microcytic anaemia of 8.3 g/dL, total white cell count of 11.0x10⁹/L, an erythrocyte sedimentation rate prolonged to 89 mm/hr (normal 1-10 mm/hr), and a C-reactive protein of 39 mg/L (normal 0-5 mg/L). Magnetic resonance imaging (Figure 3) of the right knee showed a 1 cm depression of the lateral tibial plateau with associated bone edema on T2-weighted sections. The appearances were suggestive of an insufficiency collapse. There were multiple erosions at the inner aspect of the lateral femoral condyle and advanced loss of cartilage with erosions in the patellar cartilage. In addition, moderate joint effusion and a tear of the posterior horn of the lateral meniscus were seen.

At further follow-up, an arthroscopic washout and biopsy were performed under general anesthesia. The degree of erosive change in the right knee was grade II for the patella, grade III for the medial femoral condyle and tibial plateau, and grade IV for the lateral tibial plateau. Specimens were sent for microscopy, culture, and sensitivities, and acid-fast bacilli specimens were requested. After twelve days, synovial fluid cultures were confirmed to have grown *Mycobacterium tuberculosis*. The organism was sensitive to all standard antituberculous medication. The patient was referred to a specialist in the management of TB. At further review following completion of a six-month course of TB chemotherapy, symptoms had progressively deteriorated although the patient was concordant with therapy. She was walking with the aid of one walking stick and knee flexion was 20°-50°. Radiographs showed progressive erosive joint destruction. Currently the patient is under consideration for total knee arthroplasty.

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Discussion

TB is an ancient disease. Mummified remains of ancient Egyptians show evidence of tubercular disease, and the earliest documented case of tuberculosis spondylitis was written in Sanskrit dating back to 1500 BC.³ TB proved the scourge of humankind in the years preceding antitubercular drugs and the mortality from tubercular disease reached 60%. It is estimated that there are nine million people worldwide infected with the active form of TB and it is the direct cause of around two million deaths per year.⁴

Mycobacterium tuberculosis is a nonmotile, strictly aerobic organism consisting of pleomorphic rods lacking an outer cell membrane. It is a slow-growing organism and humans are its only reservoir in nature. The particular virulence of the organism is, in part, a result of its ability to enter cells, to grow intracellularly, and to interfere with the effects of toxic oxygen intermediates. Transmission is via droplet spread.⁵

Pulmonary tuberculosis accounts for around 52%¹ of tubercular infection but musculoskeletal involvement is seen in up to 19% of cases.² It is more common in children than in adults, probably owing to the greater amount of bone marrow present in immature bone. In adults, TB shows a preponderance to the spine (40%), then the hip (25%), and finally the knee (8%).^{6,7} While extrapulmonary manifestations of TB are common, account-



Figure 1. Anteroposterior radiograph of the right knee with tricompartmental degenerative joint destruction.

ing for around 15-20% of cases in immuno-competent patients,⁸ the first presentation of the disease as a joint infection is rare. Primary bone infection with TB is less likely than hematogenous spread from a primary focus elsewhere. However, our patient showed no systemic symptoms of TB and a chest radiograph at the time of diagnosis was unremarkable. Pulmonary TB has been found to be present in only around half of those found to have bone and joint disease.⁹ The rising rate of TB is explained partly by the increase in HIV-infected patients. Other vulnerable persons include those living in group residences (nursing homes, schools, prisons), the malnourished, intravenous drug abusers, alcoholics, and immunosuppressed people.

Diagnosis of tubercular infection of bone and joints depends largely on suspicion of the diagnosis, and in an age where prevalence of the disease is rising, all clinicians should be aware of the potential of the infection. Joint TB may be suspected in a chronic case of joint pain, usually monoarticular. Although pulmonary TB may be absent, patients may demonstrate systemic symptoms of fatigue, lethargy, and weight loss. Pyrexia of unknown origin also may be a presenting feature. In 1937 Hederson and Frinton¹⁰ of the Mayo Clinic reported on a large series of patients treated for knee TB. They described the com-



Figure 2. Lateral radiograph of the right knee with tricompartmental degenerative joint destruction.



Figure 3. Coronal T2-weighted magnetic resonance image of the right knee showing articular surface destruction (arrow) of the lateral tibial plateau and associated bone edema.

mon presenting symptoms in their series as gradual onset, pain, stiffness, limp, swelling, and local heat. Radiographs demonstrate changes only after three to four weeks of infection, and initially soft tissue swelling may be the predominant feature. Later, a classic triad of radiological findings, known as the *Pemister triad*¹¹ are seen, which include juxta-articular osteopenia, joint space narrowing, and erosions. Laboratory investigations may yield the classical, although non-specific findings of raised ESR, a leukocytosis, and high C-reactive protein.¹² Histological patterns in tissue specimens will show a central necrotic area surrounded by histiocytes and occasional giant cells with nuclei positioned at the margin of the cell.¹³ Although it is suggested that the organism is difficult to culture, a 1984 study by Mondal showed an 89% sensitivity of aspirate cultures for identifying the organism in known infections.¹⁴

Options for treatment once the diagnosis is confirmed must involve antituberculous chemotherapy, but surgery may be indicated to

improve symptoms and quality of life in patients affected by joint infection. Treatment for TB in the first instance revolves around four reserved drugs: isoniazid, rifampicin, pyrazinimide, and ethambutol. Second-line treatments also are available to combat the increasingly common variant of multi-drug resistant TB (MDR-TB). Unlike for pulmonary TB, the treatment for bone and joint disease is a lengthier process, often requiring twelve to eighteen months of chemotherapy.¹⁵ Surgical management options include debridement, synovectomy, arthrodesis, and amputation, and success has been shown with primary joint arthroplasty.¹⁶

This case highlights the uncommon but increasingly recognized presentation of tuberculous arthritis of a joint. What may initially present as an uncomplicated arthritis, at a time when TB is increasing in prevalence must be considered as potential evidence of tuberculous arthritis, more in patients with a gradually worsening monoarticular arthritis and where risk factors for TB are present. Respiratory symptoms may be evident in only half of patients with skeletal involvement, and a multidisciplinary approach is required to offer patients an optimal outcome. It remains a controversial topic whether one can ever truly describe a case of primary tuberculosis of a joint; however, there remain isolated cases, such as that presented here, which seem to manifest only as extrapulmonary TB. These patients most likely represent a subset in whom TB is reactivated in some way many years after the primary infection and in whom the extrapulmonary symptoms predominate. It is these patients who often prove to be the most challenging to diagnose and treat.

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